

# **LAWRENCE LIVERMORE REPORT**

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory, June 14-18, 2010

## **Chipping away at iPod technology**



## **LLNL's Hyperion supercomputer**

The data storage chips that you find in you iPod may have a bigger use.

The Laboratory is using the same flash-memory data storage chips that consumers know from thumb drives and iPods as a third kind of data storehouse that can be used in ways to help work get done faster while reducing the need for hardware.

LLNL computer scientists are using flash-based technology from a startup called Fusion-io to create what the company and the Lab call the world's highest performance storage array. The approach uses 80 servers that are packed with flash memory modules that collectively store 100 terabytes of data. (One terabyte is 1,000 gigabytes).

The array is designed to serve data to LLNL's Hyperion, a supercomputer that the Lab and a group of companies set up to help refine software and prepare for an even bigger machine expected at Livermore next year. Those 80 servers deliver about 320 gigabytes of data a second, "which is phenomenal," says Mark Seager, the Lab's head of advanced computing technology.

To read more, go to <http://blogs.wsj.com/digits/2010/06/15/another-design-twist-for-supercomputers-flash-memory/>

## **LLNL seals a diagnosis deal for marine diseases**



### **Two harbor seals engage in rest and relaxation.**

Marine mammals like sea lions and seals are receiving a helping hand from the Laboratory.

LLNL scientists and the Sausalito-based Marine Mammal Center are working together to diagnose several diseases that have struck California sea lions and harbor seals.

In recent months, about 17 percent of the adult sea lions that have died at the Marine Mammal Center have succumbed due to cancer, and others have become ill because of the bacterial disease leptospirosis, said Frances Gulland, the center's director of veterinary science.

In June 2009, about 20 harbor seals died in Northern California from brain lesions, consisting of the premature death of living cells.

Gulland and her Livermore collaborator, biologist Crystal Jaing, are seeking to determine whether there is a bacterial or viral basis for the brain lesions and cancer through the use of a new LLNL detection technology.

To watch, go to [https://publicaffairs.llnl.gov/news/lab\\_report/2010/KTVU\\_marine.mov](https://publicaffairs.llnl.gov/news/lab_report/2010/KTVU_marine.mov)

### **A look inside the never before seen**



### **Making adjustments to the dynamic transmission electron microscope.**

Scientists can now peer into the inner workings of catalyst nanoparticles 3,000 times smaller than a human hair within nanoseconds.

The findings point the way toward future work that could greatly improve catalyst efficiency in a variety of processes that are crucial to the world's energy security, such as petroleum catalysis and catalyst-based nanomaterial growth for next-generation rechargeable batteries. The work was performed in a collaborative effort by the Laboratory and the University of California at Davis.

Using a new imaging technique on Lawrence Livermore's Dynamic Transmission Electron Microscope (DTEM), researchers have achieved unprecedented spatial and temporal resolution in single-shot images of nanoparticulate catalysts.

To read more, go to <http://www.sciencedaily.com/releases/2010/06/100616151635.htm>

### **Going underground to monitor carbon dioxide**



### **A web of cables hangs over a drill-rig during the Electric Resistance Tomography (ERT) installation process.**

Though one option to store carbon dioxide has been to deposit it deep underground, scientists haven't been able to effectively track how it might move around under there.

That's where Lawrence Livermore's Charles Carrigan's work comes into play. The advent of Electrical Resistivity Tomography (ERT), developed at LLNL, tested by the Southeast Regional Carbon Sequestration Partnership (SECARB), and funded by the Department of Energy's National Energy Technology Laboratory, shows where and how carbon moves underground.

ERT technology is similar to a computer tomography scan. It takes images of soil resistivity that allows scientists to determine the soil's properties, such as temperature, saturation and soil type.

SECARB conducted its ERT experiment at the Cranfield Oilfield near Natchez, Miss. The project will test more than one million tons of CO<sub>2</sub> in underground formations at a depth of 10,000 feet, the deepest application of ERT technology to date.

ERT uses vertical electrode arrays set up in a cross-well arrangement. Four-electrode measurements are taken to monitor changes in the distribution of electrical resistance within the underground formation. Since the CO<sub>2</sub> at the Cranfield site has resistivity five times greater than its surroundings, the ERT system can determine where the CO<sub>2</sub> is, and at what speed and trajectory it is moving.

To read more, go to <http://www.enn.com/pollution/article/41440>.

### **Cherry Murray selected for commission on BP oil spill**



### **Cherry Murray**

Earlier this week, President Barack Obama appointed a former Lab official as a member of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Cherry Murray is LLNL's former deputy director of Science and Technology, who is now dean of the Harvard School of Engineering and Applied Sciences (SEAS) and John A. and Elizabeth S. Armstrong Professor of Engineering and Applied Sciences. She also is past president of the American Physical Society.

Murray's expertise is in condensed matter and materials physics, phase transitions, light scattering and surface physics, including the study of soft condensed matter and complex fluids, as well as the management of science and technology. Previously, Murray was principle associate director (2007-2009) and deputy director (2004-2007) for Science and Technology at Lawrence Livermore.

The bipartisan commission, established through an executive order, is tasked with providing recommendations on how to prevent -- and mitigate the impact of -- any future spills that result from offshore drilling.

For more, go to <http://thepage.time.com/details-obama-announces-bp-spill-commission-members/>

#### **Latest *Newsline* available**



*Newsline* provides the latest Lab research and operations news. See the most recent issue at <https://newsline.llnl.gov>

-----  
Editor's note: The *Livermore Lab Report* will now be distributed on Fridays.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

The *Livermore Lab Report* archive is available at:  
[https://publicaffairs.llnl.gov/news/lab\\_report/2010index.html](https://publicaffairs.llnl.gov/news/lab_report/2010index.html)